

REMARKS

This response is intended as a full and complete response to the Final Office Action mailed on November 2, 2007 and Advisory Action dated January 22, 2008. In view of the following amendment and discussion, the Applicants believe that all claims are in allowable form.

CLAIM REJECTIONS**35 U.S.C. §103****Claims 1-4, 6, 8-12 and 15-17**

Claims 1-4, 6, 8-12 and 15-17 stand rejected under 35 U.S.C. § 102(b) as being anticipated over *Xu* (EP 0758148) in view of *Sone* (US. Pat. 6,451,184) and further in view of *Gilboa* (US. Pat. 5,108,569). In response, the Applicants have amended claims 1, 17, 19, 24 and 27-28 and cancelled claims 18 and 25 to more clearly recite certain aspects of the invention.

Independent claim 1 recites elements not taught or suggested by the combination of *Xu*, *Sone* and *Gilboa*. *Xu* teaches supplying a gas mixture into a chamber to deposit a TiN layer without collimated seed layer. The gas mixture is maintained in a space between the target and the substrate and reacts with the material sputtered from a target disposed in the chamber. *Xu* does not teach or suggest a second gas introduced from a bottom portion of the vacuum chamber proximate a surface of a substrate, wherein the second gas from the bottom portion of the vacuum chamber is supplied through a gap defined between a shield ring and a shield support member to the substrate surface, as recited by claim 1.

Sone teaches partitioning a gas space in a processing chamber to supply reactive gas from a partition member GB and to a substrate surface disposed on a substrate support. A shield may be disposed and circumscribed around the processing chamber. The Examiner asserts that the overlying portion of the shield 31 with the substrate support defines a gap that allows the gas to flow therethrough. However, the Applicants respectfully submit that *Sone* does not teach or suggest a second gas from a bottom portion of a vacuum chamber supplied through a gap defined between a shield ring and a shield support member, as recited by claim 1.

Gilboa teaches creating tortuous path by three cylindrical members 110, 120, 130, to direct gases into a center zone 100 defined within a processing chamber to prevent deposition on chamber walls. See Col. 9 Lines 8-14 of *Gilboa*. A clamping means 140 is positioned on an edge of a substrate support to better secure a substrate disposed on the substrate support. However, *Gilboa* does not teach or suggest a second gas from a bottom portion of a vacuum chamber supplied through a gap defined between a shield ring and a shield support member, as recited by claim 1. Additionally, the gas supplied from top opening 126 of the cylindrical members 110 through the tortuous path passing the skirt 142 of the clamping means 140 to the substrate support edge does not flow to the substrate surface. Accordingly, *Gilboa* does not teach or suggest a second gas from a bottom portion of a vacuum chamber supplied through a gap defined between a shield ring and a shield support member, as recited by claim 1.

Therefore, neither *Xu*, *Sone* nor *Gilboa*, teaches or suggest a second gas from a bottom portion of a vacuum chamber supplied through a gap defined between a shield ring and a shield support member, as recited by claim 1. Furthermore, there is no teaching or suggestion from *Sone* or *Gilboa* that would suggest one of ordinary skill in the art to modify the teaching of *Xu* in a manner that would yield a second gas from a bottom portion of a vacuum chamber supplied through a gap defined between a shield ring and a shield support member, as recited by claim 1. Accordingly, a *prima facie* case of obviousness has not been established as the references fail to teach each claimed elements.

Thus, the Applicants submit that independent claim 1 and all claims depending therefrom are patentable over *Xu* in view of *Sone* and further in view of *Gilboa*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and the claims be allowed.

35 U.S.C. §103

Claim 7

Claim 7 stands rejected under 35 U.S.C. § 103 as being unpatentable over *Xu* in view of *Sone* and *Gilboa*, and further in view of *Lantsman* (US. Pat. 5,830,330). In response, the Applicants have amended claim 1 to more clearly recite certain aspect of the invention.

Independent claim 1 recites elements not taught or suggested *Xu*, *Sone*, *Gilboa* and *Lantsman*. The patentability of claim 1 over *Xu*, *Sone* and *Gilboa* has been discussed above. *Lantsman* teaches ramping up a power to a target in a processing chamber. However, there is no teaching or suggestions from *Lantsman* that would suggest to one of ordinary skill in the art to modify *Xu*, *Sone* and *Gilboa* in a manner that would yield a second gas from a bottom portion of a vacuum chamber supplied through a gap defined between a shield ring and a shield support member, as recited by claim 1.

Thus, the Applicants submit that claim 7 that depends from claim 1 is patentable over *Xu* in view of *Sone* and *Gilboa*, and in further of *Lantsman*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and claim 7 allowed.

35 U.S.C. §103**Claim 14**

Claim 14 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over *Xu* in view of *Sone* and *Gilboa*, and further in view of *Ngan* (US. Pat. 6,203,674). In response, the Applicants have amended claim 1 to more clearly recite certain aspect of the invention.

Independent claim 1 recites elements not taught or suggested by the combination of *Xu*, *Sone*, *Gilboa* and *Ngan*. The patentability of claim 1 over *Xu*, *Sone* and *Gilboa* has been discussed above. *Ngan* teaches using a target made by titanium. However, there is no teaching or suggestions from *Ngan* that would suggest to one of ordinary skill in the art to *Xu*, *Sone* and *Gilboa* in a manner that would yield a second gas from a bottom portion of a vacuum chamber supplied through a gap defined between a shield ring and a shield support member, as recited by claim 1.

Thus, the Applicants submit that submit that claim 14 that depends from claim 1 is patentable over *Xu* in view of *Sone* and *Gilboa*, and in further view of *Ngan*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and claim 14 be allowed.

35 U.S.C. §103**Claim 18**

Claim 18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Xu*, *Sone*, *Gilboa* in view of *Chikako* (Japan 06-041733). In response, the Applicants have cancelled claim 18 without prejudice. Accordingly, the Applicants submit that the rejection is moot.

35 U.S.C. §103**Claims 19-22, 24 and 26**

Claims 19-22 and 26 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Xu* in view of *Sone*, *Yamaguchi* (U.S. Patent 6,203,674) and *Gilboa*. In response, the Applicants have amended claims 19 and 24 to more clearly recite certain aspect of the invention.

Independent claim 19 recites elements not taught or suggested *Xu*, *Sone*, *Yamaguchi* and *Gilboa*. The teachings of *Xu*, *Sone* and *Gilboa* have been discussed above. *Yamaguchi* teaches depositing a TiN film by sputtering a target containing Ti. However, there is no teaching from *Yamaguchi* that would suggest to one of ordinary skill in the art to modify *Xu*, *Sone*, and *Gilboa* in a manner that would yield creating a higher partial pressure of an active gas introduced through a bottom portion of the vacuum chamber proximate the upper surface of the substrate than at the sputtering target to deposit the metal containing film layers in the presence of the power applied to the sputter target and the coil, wherein the active gas from the bottom portion of the vacuum chamber is supplied through a gap defined between a shield ring and a shield support member to the substrate surface, as recited by claim 19. As such, a *prima facie* case of obviousness has not been established as the references fail to teach or suggest each claimed element.

Thus, the Applicants submit that independent claim 19 and claims 20-22 and 26 depending therefrom are patentable over *Xu* in view of *Sone*, *Yamaguchi* and *Gilboa*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and the claims be allowed.

35 U.S.C. §103**Claim 23**

Claim 23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Xu* in view of *Sone* and in view of *Yamaguchi* and *Gilboa*, and further in view of *Ngan*. In response, the Applicants have amended claim 19 to more clearly recite certain aspect of the invention.

Independent claim 19 recites elements not taught or suggested *Xu*, *Sone*, *Gilboa*, and *Yamaguchi* and further in view of *Ngan*. The patentability of claim 19 over the combination of *Xu*, *Sone*, *Gilboa* and *Yamaguchi* has been discussed above. *Ngan* teaches using a target made by titanium. However, there is no teaching from *Ngan* that would suggest to one of ordinary skill in the art to modify *Xu*, *Sone* *Yamaguchi* and *Gilboa* in a manner that would yield creating a higher partial pressure of an active gas introduced through a bottom portion of the vacuum chamber proximate the upper surface of the substrate than at the sputtering target to deposit the metal containing film layers in the presence of the power applied to the sputter target and the coil, wherein the active gas from the bottom portion of the vacuum chamber is supplied through a gap defined between a shield ring and a shield support member to the substrate surface, as recited by claim 19. As such, a *prima facie* case of obviousness has not been established as the references fail to teach or suggest each claimed element.

Thus, the Applicants submit that claim 23, which depends from claim 19, is patentable over *Xu* in view of *Sone*, *Yamaguchi*, *Gilboa*, and further in view of *Ngan*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and claim 23 be allowed.

35 U.S.C. §103**Claim 25**

Claim 25 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over *Xu* in view of *Sone* and in view of *Yamaguchi* and *Gilboa*, and further in view of *Chikako*. In response, the Applicants have cancelled claim 25. Accordingly, the Applicants respectfully rejection to claim 25 is moot.

35 U.S.C. §103**Claim 27**

Claim 27 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over *Xu* in view of *Sone* and *Ngan*, and in further view of *Yamaguchi* and *Gilboa*. In response, the Applicants have amended claim 27 to more clearly recite certain aspects of the invention.

Independent claim 27 recites elements not taught or suggested *Xu*, *Sone*, *Ngan*, *Yamaguchi* and *Gilboa*. The teachings of *Xu*, *Sone* and *Gilboa* have been discussed above. *Yamaguchi* teaches depositing a TiN film by sputtering a target containing Ti. *Ngan* teaches using a target made by titanium. However, there is no teaching from *Ngan* and *Yamaguchi* that would suggest to one of ordinary skill in the art to *Xu*, *Sone* and *Gilboa* in a manner that would yield creating a higher partial pressure of nitrogen through a bottom portion of the vacuum chamber proximate the upper surface of the substrate than at the sputtering target to deposit the metal containing film layers in the presence of the power applied to the sputter target and the coil, wherein the nitrogen from the bottom portion of the vacuum chamber is supplied through an annular gap defined between a shield ring and a shield support member to the substrate surface, as recited by claim 27. As such, a *prima facie* case of obviousness has not been established as the references fail to teach or suggest each claimed element.

Thus, the Applicants submit that independent claim 27 is patentable over *Xu* in view of *Sone* and *Ngan*, and further in view of *Yamaguchi* and *Gilboa*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and claim 27 be allowed.

35 U.S.C. §103**Claims 28-31**

Claims 28-31 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Xu* in view of *Sone* and *Takehara* (U.S. Patent 5,340,459), and further in view of *Yamaguchi* and *Gilboa*. In response, the Applicants have amended claim 28 to more clearly recite certain aspect of the invention.

Independent claim 28 recites elements not taught or suggested *Xu*, *Sone*, *Takehara*, *Yamaguchi* and *Gilboa*. The teachings of *Xu*, *Sone* and *Gilboa* have been discussed above. *Takehara* teaches a pipe adapted to introduce gas into a processing chamber near a substrate. *Yamaguchi* teaches depositing a TiN film by sputtering a

target containing Ti. However, there is no teaching from *Takehara* and *Yamaguchi* that would suggest to one of the ordinary skill in the art to *Xu*, *Sone* and *Gilboa* in a manner that would yield introducing a second gas into the chamber through a bottom portion of the vacuum chamber proximate the upper surface of the substrate to deposit the metal containing film layers in the presence of the power applied to the sputter target and the coil, wherein the second gas from the bottom portion of the vacuum chamber is supplied through an annular gap defined between a shield ring and a shield support member to the substrate surface, as recited by claim 28. As such, a *prima facie* case of obviousness has not been established as the references fail to teach or suggest each claimed element.

Thus, the Applicants submit that independent claim 28 and claims 29-31 depending therefrom are patentable over *Xu* in view of *Sone* and *Takehara*, and further in view of *Yamaguchi* and *Gilboa*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and the claims be allowed.

35 U.S.C. §103

Claim 32

Claim 32 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over *Xu* in view of *Sone*, *Takehara*, *Yamaguchi* and *Gilboa*, and further in view of *Ngan*. In response, the Applicants have amended claim 28 to more clearly recite certain aspect of the invention.

Independent claim 28 recites elements not taught or suggested *Xu*, *Sone*, *Takehara*, *Yamaguchi*, *Gilboa* and *Ngan*. The teachings of *Xu*, *Sone*, *Takehara*, *Yamaguchi* and *Gilboa* have been discussed above. *Ngan* teaches using a target made by titanium. However, *Ngan* fail to teach or suggest a modification to *Xu*, *Sone*, *Takehara*, *Yamaguchi* and *Gilboa* that would yield introducing a second gas into the chamber through a bottom portion of the vacuum chamber proximate the upper surface of the substrate to deposit the metal containing film layers in the presence of the power applied to the sputter target and the coil, wherein the second gas from the bottom portion of the vacuum chamber is supplied through an annular gap defined between a shield ring and a shield support member to the substrate surface, as recited by claim

28. As such, a *prima facie* case of obviousness has not been established as the references fail to teach or suggest each claimed element.

Thus, the Applicants submit that claim 32 that depends from claim 28 is patentable over *Xu, Sone, Takehara, Yamaguchi* and *Gilboa* and further in view of *Ngan*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and claim 32 be allowed.

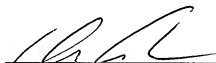
CONCLUSION

Thus, for at least the reasons discussed above, the Applicants submit that all claims now pending are in condition for allowance. Accordingly, both reconsideration of this application and swift passage to issue are earnestly solicited.

If the Examiner believes that any unresolved issues still exist, it is requested that the Examiner telephone Keith Taboada at (732) 530-9404 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Respectfully submitted,

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Date



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